
ANNALS OF THE NEW YORK ACADEMY OF SCIENCES

Volume 438

December 30, 1984

**HORMONE ACTION AND TESTICULAR
FUNCTION^a**

Editors

KEVIN J. CATT AND MARIA L. DUF AU

CONTENTS

Introduction. By KEVIN J. CATT and MARIA L. DUF AU	xv
Control of Transferrin mRNA Synthesis in Sertoli Cells. By JODI HUGGENVIK, STEVEN R. SYLVESTER, and MICHAEL D. GRISWOLD	1
Alpha-lactalbumin-like Proteins in the Male Reproductive Tract. By STEPHEN W. BYERS, MARTIN DYM, INDIRA K. HEWLETT, and PRADMAN K. QASBA	8
The Sperm Adenylate Cyclase. By DOMINIQUE STENGEL and JACQUES HANOUNE	18
Translation of Messenger RNA from Rat Epididymis and Identification of Poly(A)RNA Coding for Acidic Epididymal Glycoprotein. By R. J. BARTLETT, O. A. LEA, E. C. MURPHY, and F. S. FRENCH	29
Molecular Properties of the Androgen Receptor in Rat Ventral Prostate. By DONALD J. TINDALL, CHING H. CHANG, THOMAS J. LOBL, and DAVID R. ROWLEY	39
Modulation of Androgen Receptor Activity in the Rat Ventral Prostate. By RICHARD A. HIIPAKKA and SHUTSUNG LIAO	54
Disorders of Androgen Receptor Function. By JAMES E. GRIFFIN and JEAN D. WILSON	61
Ornithine Decarboxylase mRNA in Mouse Kidney: A Low Abundancy Gene Product Regulated by Androgens with Rapid Kinetics. By OLLI A. JÄNNE, KIMMO K. KONTULA, VELI V. ISOMAA, and C. WAYNE BARDIN	72

^a The papers in this volume were presented at the Eighth Testis Workshop, which was sponsored by the National Institute of Child Health and Human Development and held in Bethesda, Maryland on October 14-17, 1983.

Factors That Influence the Interaction of Androgen Receptors with Nuclei and Nuclear Matrix. <i>By</i> ELIZABETH M. WILSON and DOUGLAS S. COLVARD	85
Structure and Expression of Androgen-regulated Genes in Mouse Kidney. <i>By</i> CHERYL S. WATSON, DANIELA SALOMON, and JAMES F. CATTERALL	101
Organization and Expression of Genes Encoding Prostatic Steroid Binding Protein. <i>By</i> MALCOLM PARKER, HELEN HURST, and MARTIN PAGE	115
Characteristics of a Seminal Plasma Inhibitor of Sperm Motility. <i>By</i> EVE DE LAMIRANDE, MARTHE BELLES-ISLES, and CLAUDE GAGNON	125
Cyclic AMP-dependent Activation of Sea Urchin and Tunicate Sperm Motility. <i>By</i> CHARLES J. BROKAW	132
The Modulation of Sperm Metabolism and Motility by Factors Associated with Eggs. <i>By</i> MARK P. BRADLEY, NORIO SUZUKI, and DAVID L. GARBERS	142
Immunochemical Dissection of the Testes-specific Isozyme Lactate Dehydrogenase C ₄ . <i>By</i> THOMAS E. WHEAT and ERWIN GOLDBERG	156
Factors That Regulate the Development of Testicular Autoimmune Diseases. <i>By</i> KENNETH S. K. TUNG, CORY TEUSCHER, SUZANNE SMITH, LEGRANDE ELLIS, and MARIA L. DUFAU ..	171
Cytometric Analysis of Shape and DNA Content in Mammalian Sperm. <i>By</i> BARTON L. GLEDHILL	189
Genetic Analysis of Mammalian Spermatogenesis: Use of the t Complex in the Mouse in Studies of Spermatogenesis and Sperm Function. <i>By</i> PATRICIA OLDS-CLARKE	206
Scanning Transmission Electron Microscopy of Dynein Arms. <i>By</i> KENNETH A. JOHNSON	217
Incorporation of Radiolabeled Amino Acids into Protein Subunits of the Rat Leydig Cell Gonadotropin Receptor: Application to the Study of Receptor Structure and Turnover. <i>By</i> PHILIPPE CRINE, MURIEL AUBRY, and MICHEL POTIER	224
Studies on Leydig Cell Purification. <i>By</i> DANIEL R. AQUILANO and MARIA L. DUFAU	237
Regulation of the Synthesis of Cholesterol Side-chain Cleavage Cytochrome P-450 and Adrenodoxin in Rat Leydig Cells in Culture. <i>By</i> CHRISTEN M. ANDERSON and CAROLE R. MENDELSON	259

Control of Steroidogenesis in Leydig Cells: Roles of Ca^{2+} and Lipoxygenase Products in LH and LHRH Agonist Action. By B. A. COOKE, C. J. DIX, A. D. HABBERFIELD, and M. H. F. SULLIVAN	269
Functional Maturation of Rat Testis Leydig Cells. By ILPO T. HUHTANIEMI, DWIGHT W. WARREN, and KEVIN J. CATT	283
Maturation of the Human Testicular Response to hCG. By MAGUELONE G. FOREST	304
Trophic Influences of Luteinizing Hormone on Steroidogenesis by Percoll-separated Rat Leydig Cells in Culture. By MICHAEL J. BORDY, JOEL H. SHAPER, and LARRY L. EWING	329
Identification and Possible Function of Pro-opiomelanocortin-derived Peptides in the Testis. By C. W. BARDIN, C. SHAHA, J. MATHER, Y. SALOMON, A. N. MARGIORIS, A. S. LIOTTA, I. GERENDAI, C.-L. CHEN, AND D. T. KRIEGER	346
Beta-endorphin, Met-enkephalin, and Calcitonin in Human Semen: Evidence for a Possible Role in Human Sperm Motility. By FRANCO FRAIOLI, ANDREA FABBRI, LUCIO GNESSI, LEOPOLDO SILVESTRONI, COSTANZO MORETTI, FRANCESCO REDI, and ALDO ISIDORI	365
Studies on the Identification of a LHRH-like Peptide in the Rat Testis. By M. P. HEDGER, D. M. ROBERTSON, C. A. BROWNE, and D. M. DE KRETZER	371
GnRH-like Factors in the Rat Testis and Human Seminal Plasma. By RONALD S. SWERDLOFF, SHALENDER BHASIN, REBECCA Z. SOKOL	382
LHRH-like Substance in the Rat Testis. By AKIRA ARIMURA and CHARLES M. TURKELSON	390
Tissue Interactions and Prostatic Growth: A New Mouse Model for Prostatic Hyperplasia. By LELAND W. K. CHUNG, JAMES MATSUURA, AUDREY K. ROCCO, TIMOTHY C. THOMPSON, GARY J. MILLER, and MEREDITH N. RUNNER	394
Extracellular Matrix in Testicular Differentiation. By LAURI J. PELLINIEMI, JORMA PARANKO, SILVIA K. GRUND, KIM FRÖJDMAN, JEAN-MICHEL FOIDART, and TAINA LAKKALA-PARANKO	405
Effect of Substrate on the Shape of Sertoli Cells <i>in Vitro</i> . By CARLOS A. SUÁREZ-QUIAN, MARK A. HADLEY, and MARTIN DYM	417

Cooperativity between Sertoli Cells and Peritubular Myoid Cells in the Formation of the Basal Lamina in the Seminiferous Tubule. <i>By</i> PIERRE S. TUNG, MICHAEL K. SKINNER, and IRVING B. FRITZ	435
Therapeutic Considerations and Results of Gonadotropin Treatment in Male Hypogonadotropic Hypogonadism. <i>By</i> HENRY G. BURGER and H. W. G. BAKER	447
Gonadotropin Replacement Therapy in Patients with Hypogonadotropic Hypogonadism. <i>By</i> E. VICARI, A. MONGIOI', and R. D'AGATA	454
Relevance of Sperm Maturity Detection in Gonadotropin Treatment. <i>By</i> GAETANO FRAJESE	459
The Response of Prolactin to Chlorpromazine: Use in the Differential Diagnosis of Hypogonadotropic Hypogonadism and Delayed Puberty. STEPHEN J. WINTERS, RICHARD J. SHERINS, and ROGER E. JOHNSONBAUGH	462
Gonadotropin Control of Spermatogenesis in Man: Studies of Gonadotropin Administration in Spontaneous and Experimentally Induced Hypogonadotropic States. <i>By</i> WILLIAM J. BREMNER, A. M. MATSUMOTO, and C. A. PAULSEN	465

SHORT PAPERS

An Ultrastructural Study of the Cytoplasmic Bridges between Germ Cells of the Canine Testis. <i>By</i> CAROLYN J. CONNELL...	472
Further Observations on the Microfilament Bundles of Sertoli Cell Junctional Complexes. <i>By</i> C. A. SUAREZ-QUIAN and M. DYM	476
A Simple Method for Quantitative Analysis of Human Testicular Biopsies from Epon Sections. <i>By</i> J. CHAKRABORTY, A. P. SINHA-HIKIM, and J. JHUNJHUNWALA	481
Modulation of the Pulsatile Release of Biologically Active Luteinizing Hormone by Endogenous Opiates. <i>By</i> J. D. VELDHIJS, A. D. ROGOL, M. L. JOHNSON, and M. L. DUFAU	485
Leydig Cell Cytoplasmic Mass, Daily Sperm Production, and Serum Gonadotropin Levels in Aging Men. <i>By</i> W. B. NEAVES, L. JOHNSON, J. C. PORTER, C. R. PARKER, JR., and C. S. PETTY	490
Effect of Age and Illness on LH Bio/Immuno Ratio. <i>By</i> B. WARNER, M. L. DUFAU, and R. J. SANTEN	492
Idiopathic Post-pubertal LH Deficiency. <i>By</i> G. R. CUNNINGHAM	497
Circulating Immune Complexes and Antisperm Antibodies in Vasectomized and Vasovasostomized Rhesus Macaques. <i>By</i> N. J. ALEXANDER, T. B. CLARKSON, and D. L. FULGHAM ...	501

Detection of Spontaneously Occurring Sperm-directed Antibodies in Infertile Couples by Immunobead Binding and Enzyme-linked Immunosorbent Assay. By R. BRONSON, G. COOPER, D. ROSENFELD, and S. S. WITKIN.....	504
Characterization of Human Sperm Antigens Using Monoclonal Antibodies. By M. D. HIRSCHL, M. A. ISAHAKIA, and N. J. ALEXANDER.....	508
Evaluation of Serum Antisperm Antibodies in Infertile Patients by Means of an Enzyme-linked Immunoabsorption Assay. By N. J. ALEXANDER and D. BEARWOOD.....	512
Rat Spermatogenesis <i>in Vitro</i> Traced by Live Cell Squashes and Monoclonal Antibodies. By J. TOPPARI, W. R. A. BROWN, and M. PARVINEN.....	515
Genetic Control of Steroidogenesis and Spermatogenesis in Inbred Mice. C. CHUBB AND C. NOLAN.....	519
The Expression of Haploid-specific Genes Including an α Tubulin During Spermatogenesis in the Mouse. By R. J. DISTEL, K. C. KLEENE, and N. B. HECHT.....	523
Sequential Analysis of the Epididymal Sperm Maturation Process in the Boar. J. L. DACHEUX, M. PAQUIGNON, and M. LANNEAU.....	526
Rat and Bull Sperm Immobilization in the Caudal Epididymis: A Comparison of Mechanisms. By M. C. USSELMAN, D. W. CARR, and T. S. ACOTT.....	530
Localization of a Sperm Surface Molecule in the Epididymis. By C. H. MULLER and E. M. EDDY.....	533
Evidence for a Protease Involvement in Sperm Motility. By C. GAGNON, E. DE LAMIRANDE, and M. BELLES-ISLES.....	535
Sperm Motility in a Non-mammalian Vertebrate: The Lizard <i>Lacerta vivipara</i> Acquisition of Sperm Motility and Its Maintenance during Storage. By A. DEPEIGES and J. L. DACHEUX.....	537
Phospholipid Methylation during Chemotaxis of Starfish Spermatozoa. By J. TEZON, R. MILLER, and C. W. BARDIN ..	540
Glucose Metabolism in Rat Germ Cells: Mechanism of Action of Gossypol. By S. M. TVERMYR, A. FRØYSA, N. H. P. M. JUTTE, and V. HANSSON.....	543
Effect on Pregnancy Outcome of Suppression of Spermatogenesis by Testosterone. By B. ROBAIRE, S. SMITH, and B. F. HALES	546
Initiation, Restoration, and Maintenance of Spermatogenesis in Non-human Primates by Testosterone. By G. R. MARSHALL and E. NIESCHLAG.....	549

FSH And Catecholamine Regulation of Sertoli Cell Adenylyl Cyclase: Requirement for Desensitization in a Cell-free System. <i>By H. ATTRAMADAL, T. JAHNSEN, and V. HANSSON.</i>	551
Serum Follicle Stimulating Hormone, Androgen Binding Protein, and Regeneration of the Seminiferous Epithelium after Local Testicular Irradiation. <i>By J. I. DELIC, J. H. HENDRY, I. D. MORRIS, and S. M. SHALET</i>	554
Spermatogenic Cells in the Germinal Epithelium Utilize α -Ketoisocaproate and Lactate, Produced by Sertoli Cells from Leucine and Glucose. <i>By J. A. GROOTEGED, R. JANSEN, and H. J. VAN DER MOLEN</i>	557
Rat Sertoli Cells and Epididymal Epithelium Secrete a Protein Found in Mature Sperm. <i>By S. R. SYLVESTER and M. D. GRISWOLD</i>	561
Glucagon-stimulated Cyclic AMP Formation in Rat Sertoli Cells: Inhibitory Effects of Adenosine. <i>By L. EIKVAR, F. O. LEVY, H. ATTRAMADAL, N. H. P. M. JUTTE, E. M. RITZÉN, R. HORN, and V. HANSSON</i>	563
Metabolism of Palmitate in Cultured Sertoli Cells and Interaction with Glucose Metabolism. <i>By N. H. P. M. JUTTE and V. HANSSON</i>	566
Alteration of the Normal Age-related Decline in Sertoli Cell Responsiveness to FSH in the H ^{re} Rat. <i>By J. J. HEINDEL, A. S. BERKOWITZ, and A. BARTKE</i>	569
Effect of Purified and Cell-produced Extracellular Matrix Components on Sertoli Cell Function. <i>By J. P. MATHER, S. D. WOLPE, G. L. GUNSALUS, C. W. BARDIN, and D. M. PHILLIPS</i>	572
Sertoli Cell Adenylyl Cyclase Is Stimulated by a Factor Associated with Germ Cells. <i>By M. J. WELSH, M. E. IRELAND, and G. J. TREISMAN</i>	576
Low Molecular Weight Factors in Bovine Serum Which Inhibit FSH Binding to Calf Testis Receptors. <i>By T. T. ANDERSEN, P. M. SLUSS, and L. E. REICHERT, JR.</i>	579
Evidence for a Soluble Fetal Urogenital Sinus-derived Growth Factor(s). <i>By T. C. THOMPSON and L. W. K. CHUNG</i>	582
Maturational and Androgen-dependent Aspects of Sertoli Cell Function. <i>By B. M. SANBORN, J. R. WAGLE, and A. STEINBERGER</i>	586
Detection of Estrogen Receptors in Cultured Sertoli Cells. <i>By A. M. NAKHLA, O. A. JÄNNE, J. P. MATHER, and C. W. BARDIN</i>	588

Properties and Compartmentalization of the Testicular Receptor for 1,25-Dihydroxyvitamin D ₃ . By F. O. LEVY, L. EIKVAR, N. H. P. M. JUTTE, and V. HANSSON	591
Gonadotropin-induced Changes in the LH Receptors in Cultured Leydig Cells: Measurement of the Immunoactive Bound Hormone. By J. L. S. BARAÑO and M. L. DUFAU	594
Structural Characteristics of the Leydig Cell Lactogen Receptors. By J. BONIFACINO AND M. L. DUFAU	598
Effect of hCG on Testicular Steroidogenesis and Gonadotropin and Prolactin Receptors in Unilaterally Cryptorchid Rats. By ILPO HUHTANIEMI, ANDERS BERGH, HANNU NIKULA, and JAN-ERIK DAMBER	602
Changes in Gonadotropin and Isoproterenol Stimulated Adenylate Cyclase Activities in Rat Testicular Tissue during Cryptorchidism. By T. JAHNSEN, B. KARPE, H. ATTRAMADAL, A. ERICHSEN, E. HAUG, M. RITZEN, V. HANSSON	606
Development of Adenosine Responsiveness after Isolation of Leydig Cells. By F. F. G. ROMMERTS, R. MOLENAAR, J. W. HOOGEBRUGGE, and H. J. VAN DER MOLEN	609
Effects of Temporary or Permanent Cryptorchidism on Leydig and Sertoli Cell Functions in the Lamb. By C. MONET-KUNTZ, B. BARENTON, M. BLANC, A. LOCATELLI, J. PELLETIER, C. PERREAU, and M. T. HOCHEREAU-DE-REVIERS	612
Effects of 20- α -Hydroxy-4-pregnen-3-one Treatment on the Hypophyseal Testicular Axis in Rats. By K. E. FRIEDL, S. R. PLYMATE, B. L. FARISS, M. J. GARRISON, and L. A. MATEJ.. ..	615
Characteristics of Leydig Cells and Macrophages from Developing Testicular Cells. By R. MOLENAAR, F. F. G. ROMMERTS, and H. J. VAN DER MOLEN	618
"Antigonadal" Activity of the Neurohypophysial Hormones: Direct <i>in Vivo</i> Regulation of Leydig Cell Function. By E. Y. ADASHI and C. E. RESNICK	622
Comparison Of LH and LHRH Agonist Action on Steroidogenesis in Rat Leydig Cells. By A. P. N. THEMME, F. F. G. ROMMERTS, and H. J. VAN DER MOLEN	625
Acute Stimulation of Rat Leydig Cell Steroidogenesis by Gonadotropin-releasing Hormone: Investigation of the Mechanism of Action. By W. H. MOGER	629
Testicular Tyrosine-specific Protein Kinase Activity: High Levels in Purified Leydig Cells. By M. H. MELNER, D. PUETT, D. L. GARBERS, and L. DANGOTT	632

Ultrastructural, Morphometric, and Functional Characterization of Interstitial Cells from Mouse Testes Fractionated on Percoll Density Gradients. <i>By J. B. KERR, D. M. ROBERTSON, and D. M. DE KRETZER</i>	636
A Model System to Study the Morphogenic and Steroidogenic Effects of Various Gonadotropins on the Leydig Cell of the Boar. <i>By M. MESURE-MORAT and J. P. DUFAYRE</i>	638
Direct Stimulation of Phospholipid Labeling and Steroidogenesis by Gonadotropin Releasing Hormone in Purified Rat Leydig Cells. <i>By T. LIN and J. L. ORCHARD</i>	642
Changes in Testosterone Hydroxylase Activity in Rat Testis following Administration of 2,3,7,8-Tetrachlorodibenzo-p-Dioxin (TCDD). <i>By J. C. MITTLER, N. H. ERTEL, R. X. PENG, C. S. YANG, and T. KIERNAN</i>	645
Microsomal Cytochrome P-450 Enzyme Damage in Cultured Leydig Cells: Relation to Steroidogenic Desensitization. <i>By P. G. QUINN and A. H. PAYNE</i>	649
Use of Inherited Differences among Strains of Inbred Mice to Study Genetic Determinants of Steroid Biosynthesis. <i>By J. R. D. STALVEY and A. H. PAYNE</i>	652
A Transplantable Rat Leydig Cell Tumor: Binding Properties, Hormonal Responsiveness, and Tumor Growth. <i>By A. ERICHSEN, T. JAHNSEN, H. ATTRAMADAL, D. ANDERSEN, and V. HANSSON</i>	655
Expression of Pro-opiomelanocortin-like Gene in the Testis and Leydig Cell Lines. <i>By C.-L. C. CHEN, J. P. MATHER, P. L. MORRIS, and C. W. BARDIN</i>	659
Regulation of 3β -Hydroxysteroid Dehydrogenase Activity by Human Chorionic Gonadotropin, Androgens, and Antiandrogens in Cultured Testicular Cells. <i>By C. M. R. GALARRETA, L. F. FANJUL, E. Y. ADASHI, and A. J. W. HSUEH</i>	663
Gonadotropic Regulation of Aromatase Activity in the Adult Rat Testis. <i>By C. H. TSAI-MORRIS, D. R. AQUILANO, and M. L. DUFAY</i>	666
Localization of [3 H]Aldosterone in the Rat Epididymis. <i>By B. T. HINTON and D. A. KEEFER</i>	670
Induction of Testicular Development in the Fetal Mouse Ovary. <i>By T. TAKETO, S. S. KOIDE, and H. MERCHANT-LARIOS</i>	671
Ontogenic Changes in the Ability of Estradiol to Suppress Androgen Secretion in the Rat. <i>By D. K. POMERANTZ</i>	675

Adrenocorticotropin Stimulates Testosterone Production by Fetal Rat Testes. <i>By</i> D. W. WARREN, C. A. SCHMITT, and S. J. FRANZINO	677
Cyclic Regulation of Rat Leydig Cell Testosterone Production by Seminiferous Tubules. <i>By</i> M. PARVINEN, H. NIKULA, and I. HUHTANIEMI	681
Synergistic Effects of Sertoli Cell and FSH on Leydig Cell Function: <i>in Vitro</i> Study. <i>By</i> M. BENAHMED, J REVENTOS, E. TABONE, and J. M. SAEZ	684
The Nongerminal Cell Lines of the Testis Contain Five Acid Phosphatases. <i>By</i> T. VANHA-PERTTULA, J. P. MATHER, and C. W. BARDIN	688
Rat Leydig Cells in Monolayer Culture: Effects of Various Media on Growth and Steroidogenesis. <i>By</i> C. D'ARVILLE and B. A. COOKE	690
Index of Contributors	693
Subject Index	697

The New York Academy of Sciences believes it has a responsibility to provide an open forum for discussion of scientific questions. The positions taken by the participants in the reported conferences are their own and not necessarily those of The Academy. The Academy has no intent to influence legislation by providing such forums.